

Course Number: CHEM 161L (CRN 61085; 1 credit) — SUMMER 2014

Class Meeting Days and Times: TR 10:00 – 11:00 am ('Imiloa 111)
11:00 am – 12:45 pm ('Imiloa 131)

Instructor: Dr. Christopher Guay

Email: cguay@hawaii.edu

Course website: <http://laulima.hawaii.edu> (use UH email account login and password)

Office Hours: TR 9:00-10:00 am; TR 1:00-2:00 pm ('Imiloa 136)

WINDWARD COMMUNITY COLLEGE MISSION STATEMENT

Windward Community College offers innovative programs in the arts and sciences and opportunities to gain knowledge and understanding of Hawai'i and its unique heritage. With a special commitment to support the access and educational needs of Native Hawaiians, we provide O'ahu's Ko'olau region and beyond with liberal arts, career and lifelong learning in a supportive and challenging environment — inspiring students to excellence.

CATALOG DESCRIPTION OF THE COURSE

Laboratory experiments illustrating fundamental principles of chemistry. (3 hrs. lab)

Prerequisite: Credit or registration in CHEM 161.

WCC: DY

STUDENT LEARNING OUTCOMES

1. Apply laboratory safety procedures and respond to hazards.
2. Use molecular and crystal models, perform common laboratory techniques competently and computer-based experiments to verify chemistry laws on stoichiometry, thermochemistry, behavior of gases and liquids.
3. Apply and articulate the scientific method by preparing lab reports using the standard scientific format. Express in writing core chemistry principles, results of experiments and do critical thinking by synthesizing conclusions based on observations and data.
4. Make and record precise measurements, calculate results using significant figures, standard deviations and identify sources of error in laboratory experiments.
5. Use computer competently, word-processing, spreadsheet and graphing.
6. Prepare chemical solutions, perform dilutions, calculate solution concentrations and generate a calibration curve.

REQUIRED COURSE MATERIALS

- Chemistry 161L Laboratory Manual, edited by L. Colmenares
- You will also need a scientific calculator, safety goggles, and Internet access.

PURPOSE OF THE LABORATORY COURSE

The chemistry laboratory course allows the student to develop a more thorough understanding of the theories and concepts discussed in the lecture course. In the laboratory, you will be involved with the processes of scientific inquiry used to discover chemical principles. It is the only way for the student to learn the techniques that are so important in research and laboratory environments. The student will discover that doing quality work in the laboratory requires a great deal of patience and care.

CLASS FORMAT

Each class will be split into two sessions:

Pre-lab Session ('Imiloa 111): This will be a classroom discussion of the experiment that will be performed that day. We will go over the pre-lab assignment, the experimental procedure described in the lab manual, and any special safety precautions. If necessary, the use of specific equipment or laboratory techniques required for the experiment will be demonstrated. This will be the time for you to ask questions and make sure that you understand what you will be doing when you conduct the experiment – in terms of being able to carry out the correct procedural steps as well as understanding the overall purpose of the experiment and related chemical concepts.

IMPORTANT: You will need to have completed the online pre-lab assignment and the pre-lab activity in the lab manual **before** coming to the pre-lab session – I will be checking your work at the beginning of class. I will also be taking attendance at the beginning of the pre-lab session, so you need to be there for the entire session (you can not skip the pre-lab session and just come to the laboratory session to perform the experiment).

Laboratory Session ('Imiloa 131): Following the pre-lab session, we will move from the classroom to the laboratory to perform the experiment for the day. The primary mode of instruction in this course is through hands-on laboratory activities, so the laboratory session is the most crucial aspect of this course. You will set up the equipment for the experiment, carry out the steps in the experimental procedure, record your observations and data, and perform calculations to obtain your results. The last 10 minutes of the class will be devoted to cleaning up your workspace and equipment and putting everything away. The worksheets (or formal lab report) for the experiment will be due at the beginning of the following week's pre-lab session.

GRADING

1. Grades will be based on the following categories:

- 10 Experiment Worksheets (20 pts each)
- 3 Formal Lab Reports (50 pts each)
- 12 Online Pre-lab Assignments (5 pts each)
- 2 Exams (95 pts each)

Total points possible for course: 600 pts

The number of points you earn for the course will be calculated as a percentage of the total points possible for the course. This percentage score will be used to assign your grade for the course as follows:

- A: 100 - 90.0 %
- B: 89.9 - 80.0 %
- C: 79.9 – 70.0 %
- D: 69.0 – 60.0 %
- F: below 60 %

2. **Pre-lab Assignments (Online):** Each experiment will have an associated pre-lab assignment posted on the course website (Laulima). The pre-lab assignment will constitute **10% of your grade** for the experiment. You should budget two hours for working on the pre-lab assignment. You must complete the pre-lab assignment for the corresponding experiment **before** coming to the pre-lab session that day (access to the online pre-lab assignment on Laulima will close at the start of class time on the day of the experiment).
3. **Experiment Worksheets:** Every experiment in the laboratory manual includes worksheets at the end that consist of a pre-lab activity, data tables, and post-lab questions. The pre-lab activity must be completed before you begin an experiment (if you haven't completed the pre-lab activity, you will not

be allowed to perform the experiment during the lab session). As you are conducting the experiment, record your data and observations in the data tables. After you finish the experiment, you answer all of the post-lab questions (be sure to show your work and calculations). The completed worksheets for an experiment must be torn out of the lab manual (carefully!) and turned in at the beginning of the following week's pre-lab session.

4. **Formal Lab Reports:** A **formal** laboratory report is required for three of the experiments (Experiment III. Conductivity of Solutions of Ionic and Covalent Compounds; Experiment IX. Boyle's Law: Pressure-Volume Relationship in Gases; Experiment XII. Additivity of Enthalpy: Hess' Law). **Formal reports** should follow the standard format for laboratory reports – we will discuss this in class, and are tips on writing formal lab reports are given in an appendix in the lab manual. A sample of a formal lab report can be downloaded from the course website on Laulima.
5. There will be **two exams**, each of which will cover approximately one half of the course. Each exam will last for 75 minutes. The exams will be closed book.
6. There will be **no final exam** for this course.

COURSE POLICIES

1. The **course schedule** (experiment titles and corresponding dates) is included at the end of this syllabus. Any changes in the schedule will be announced in class (or on the course website) at least a week prior to the affected date. You are responsible for obtaining this information, whether or not you were present when the announcement was made during class.
2. **You must be prepared for each class!** This means that you need to do the following before coming to the pre-lab session each week:
 - thoroughly read the background and procedure for the experiment in the lab manual
 - complete the online pre-lab assignment (on the course website on Laulima)
 - complete the pre-lab activity in the lab manual
3. **Come to class on time!** Attendance will be checked at the start of the pre-lab session. Important background information and safety precautions for the experiment will be discussed during the pre-lab session, and you are expected to ask questions and take notes. The instructor may disallow the student from the lab session or deduct 10% from the grade for the experiment if the student is absent from the pre-lab session.
4. Bring your **lab manual and scientific calculator** to every class.
5. **Safety** is of the **utmost** importance. There are many potential dangers in any laboratory, and you can minimize the risk of harm to yourself and/or others by strictly observing all laboratory safety rules, policies, and procedures. Some of the most important of these include:
 - Wear your **safety glasses/goggles** at **all times** when you are in the laboratory ('Imiloa 131) – whether or not you are actively performing any experimental procedures. Do not slide your glasses up onto your forehead or take your glasses off when you think no one is looking and attempt to put them back on quickly when the instructor walks by. **I am a real stickler about this!** I don't want anyone going blind as a result of an accident in one of my labs (stop for a moment and **think about what it would be like to go through the rest of your life without your eyesight**). If I see you without your glasses on at any time in the lab, I will warn you once to put them back on and leave them on. If it happens again, I will ask you to leave the laboratory for the rest of the lab session.
 - **Wear closed-toed shoes** (preferably sports shoes) to protect yourself from the danger of spilling chemicals. Slippers, sandals or similar footwear **are not allowed**. You will NOT be permitted in the lab if you are not wearing close-toed shoes.
 - To protect yourself from chemical spills, it is best to wear **long pants or a long skirt** and a **long-sleeved shirt/top** when you are working in the lab. Wear clothes made of cotton or wool -- **avoid synthetic fabrics**, as these can be extremely flammable and constitute an extreme fire hazard. If

you are wearing **shorts, a short skirt, tank tops, etc.**, you will need to wear a lab coat or lab apron over your clothes.

- **No eating or drinking at any time during the lab.** This includes coffee, water bottles, etc. There are many dangerous chemicals present in the laboratory and it is very easy for food or drink to be contaminated with substances that can be highly harmful to you if ingested – even in trace amounts. If you need a snack or a drink of water, go outside the lab and wash your hands thoroughly with soap or water before eating or drinking.
 - Of course, there is **no smoking** allowed in the laboratory at any time.
 - **Do not use cell phones in the laboratory.** If you really need to make a call or send/read a text message, step outside of the laboratory to do it.
6. Treat all chemicals with respect. Wipe up any spills, return all reagents to the proper place, replace lids on bottles, and report any accidents or problems to the instructor. Precisely follow the **directions in the experimental procedure** for use and disposal of chemicals.
 7. During the lab sessions, you will **work in pairs** to perform the experiments. Maintain a positive attitude and work cooperatively with other students and the laboratory instructor. Be alert and maintain presence of mind. Treat the lab sessions as opportunities to learn and do **not** simply **rush** through an experiment in order to finish as quickly as possible. Do not take shortcuts!
 8. When recording a **measurement**, you must write down a value that reflects the precision of the instrument used (never round-off arbitrarily) and affix the correct unit. **Record all your data** neatly in ink, with units included. Points will be deducted for data with incorrect precision or missing/incorrect units.
 9. **Do not erase original data** -- if you make a mistake, just draw a line through it (so an auditor examining your data/calculations could see what happened and be convinced that you were not trying to hide anything).
 10. **Before dismantling your experimental setup**, do a quick calculation to check whether your results are reasonable. Repeat the experiment if you have made a mistake. Consult the instructor to discuss the probable causes of error before doing the repeat. *If your results are not what you expected, do not try to make up data to get your results to turn out how you want them to* – this is unethical and scientifically/academically dishonest, and it is painfully obvious when students attempt to do this.
 11. **Use laboratory time efficiently** and bear in mind that the experiment should be completed at least ten minutes before the end of class to allow for cleanup.
 12. When you have finished your work, **wash and put away all of your lab glassware and equipment** in the proper storage areas -- otherwise, points will be deducted. Points will also be deducted if safety precautions, chemical transfer, clean-up, and waste disposal techniques and procedures are not followed.
 13. After finishing the experiment, **perform your calculations as soon as possible (be sure to round off your answers to the correct number of significant figures)**. Do not procrastinate and wait until the night before the next class to complete the worksheets or write your formal lab report. Remember you will also need to prepare for the upcoming experiment, so budget your time wisely.
 14. You are expected to discuss results, calculations and interpretations with your laboratory partner and classmates, but calculations and answers in your worksheets and lab reports should be **completely your own work**. Copying someone else's work or answers is considered cheating. There will be **ZERO TOLERANCE for cheating or academic dishonesty**. If you are caught cheating, you will receive an "F" grade for the assignment and be reported to the Department Head and the Dean's Office.
 15. **There are no make-ups allowed if you miss a lab session.** If you did not perform an experiment, you will receive a score of zero for that experiment. You **cannot** turn in worksheets or lab reports using someone else's data.

16. **Late Work.** You can submit worksheets/lab reports up to one week after the due date, but you will be **penalized 30%** (*i.e.*, 6 points will be deducted from your raw score for the assignment). You will not receive credit for any work that is turned in more than one week late.
17. If you have any **special learning needs**, including hearing/visual impairment, please inform the instructor as soon as possible.

DISABILITIES ACCOMMODATION

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor (Ann Lemke) to discuss reasonable accommodations that will help you succeed in this class. She can be reached at 235-7448 or lemke@hawaii.edu. You can also drop by her office in 'Akoakoa 213.

WEEK	DATE	EXPERIMENT NUMBER AND TITLE
1	May 27 (Tue)	I. Laboratory Safety, Equipment & Procedures II. Scientific Measurements & Density
1	May 27 (Thu)	XI. Thermal Energy Associated with Chemical & Physical Changes (Parts I & II)
2	Jun 3 (Tue)	IV. Determination of Chemical Formula
2	Jun 5 (Thu)	V. Types of Chemical Reactions
3	Jun 10 (Tue)	III. Conductivity of Solutions of Ionic and Covalent Compounds**
3	Jun 12 (Thu)	VI. Stoichiometry Experiment
4	Jun 17 (Tue)	VII. Solution Preparation & Concentration
4	Jun 19 (Thu)	VIII. Determination of the Concentration of Acetic Acid in Vinegar
5	Jun 24 (Tue)	IX. Boyle's Law: Pressure-Volume Relationship in Gases**
5	Jun 26 (Thu)	X. Pressure-Temperature Relationship in Gases
6	Jul 1 (Tue)	XII. Additivity of Enthalpy: Hess' Law**
6	Jul 3 (Thu)	XIII. Lewis Formula and Molecular Shapes

**** Requires formal lab report**

EXAMS

Exams must be taken at the Testing Center at some time over the specified dates

Exam 1: Mon Jun 16 through Wed Jun 18

Exam 2: Wed Jul 2 through Mon Jul 7 (the Testing Center will be closed Jul 4-6)